Name:

at1119paper: Complete the Square, b = odd (v504)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 53x = -546$$

Add $\left(\frac{-53}{2}\right)^2$, which equals $\frac{2809}{4}$, to both sides of the equation.

$$x^2 - 53x + \frac{2809}{4} = \frac{625}{4}$$

Factor the left side.

$$\left(x + \frac{-53}{2}\right)^2 = \frac{625}{4}$$

Undo the squaring.

$$x + \frac{-53}{2} = \frac{-25}{2} \quad \text{or} \quad x + \frac{-53}{2} = \frac{25}{2}$$
$$x = \frac{53 - 25}{2} \quad \text{or} \quad x = \frac{53 + 25}{2}$$
$$x = 14 \quad \text{or} \quad x = 39$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 + 21x = -54$$

$$x^2 + 21x + \frac{441}{4} = \frac{225}{4}$$
$$\left(x + \frac{21}{2}\right)^2 = \frac{225}{4}$$

$$x + \frac{21}{2} = \frac{-15}{2} \quad \text{or} \quad x + \frac{21}{2} = \frac{15}{2}$$
$$x = \frac{-21 - 15}{2} \quad \text{or} \quad x = \frac{-21 + 15}{2}$$
$$x = -18 \quad \text{or} \quad x = -3$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 + 27x = 160$$

$$x^2 + 27x + \frac{729}{4} = \frac{1369}{4}$$

$$\left(x + \frac{27}{2}\right)^2 = \frac{1369}{4}$$

$$x + \frac{27}{2} = \frac{-37}{2} \quad \text{or} \quad x + \frac{27}{2} = \frac{37}{2}$$

$$x = \frac{-27 - 37}{2} \quad \text{or} \quad x = \frac{-27 + 37}{2}$$

$$x = -32 \quad \text{or} \quad x = 5$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 + 47x = -522$$

$$x^2 + 47x + \frac{2209}{4} = \frac{121}{4}$$

$$\left(x + \frac{47}{2}\right)^2 = \frac{121}{4}$$

$$x + \frac{47}{2} = \frac{-11}{2} \quad \text{or} \quad x + \frac{47}{2} = \frac{11}{2}$$

$$x = \frac{-47 - 11}{2} \quad \text{or} \quad x = \frac{-47 + 11}{2}$$

$$x = -29 \quad \text{or} \quad x = -18$$